IN THE SPECIFICATION:

Before Paragraph 1, please insert the following new paragraph:

CROSS-REFERENCE

[0000.5] This non-provisional application claims benefit of and priority to German Application Number 103 11 610.9-23, filed March 14, 2003, the disclosure of which is hereby incorporated by reference herein.

BACKGROUND

[0001] The ~~invention~~ present disclosure relates to a rotary-cutting disk having a draining duct for a liquid phase from a centrifuge, particularly from a separator.

[0002] Rotary-cutting disks - also called grippers - for centrifuges are known in many different embodiments~~; thus~~such as from U.S. Patent Document US 2,667,338. It is their object to drain a liquid phase from a centrifuge. Because of the type of their construction, many of the known solutions require high expenditures for their manufacture. Examples of this type are shown in European Patent Document EP 0 892 680 B1, International Patent Document PCT/SE88/00181, U.S. Patent Document US 4,406,652, U.S. Patent Document US 2,230,210 or European Patent Document EP 0 756 523 B1.

[0003] British Patent Document GB 987023 and European Patent Document EP 0 756 523 are also mentioned with respect to the state of the art.

[0004] In practice, depending on the number of liquid phases to be drained, one or more of the rotary-cutting disks are arranged concentrically with respect to the axis of rotation of the centrifuge. Thus, it is known, for example, to place the rotary-cutting disks onto an intake tube of a separator. Furthermore, generally, the rotary-cutting disks have a disk-shaped or plate-shaped base section preferably adjoined by a tube-shaped section. They generally stand still relative to the rotating centrifuge. They have at least one draining duct by ~~means of~~ which liquid is again diverted from the inlet at the outer circumference of the disk-shaped section to the outlet in one or more axial draining duct/ducts in the tube-shaped section and, from there, the liquid is drained from the centrifuge. The at least one draining duct diverts the liquid in the disk-shaped section in the case of a known

variant, for example, by slightly more than 90° from the flow direction at the outer circumference of the rotary-cutting disk in a curve toward the inside.

[0005] It is known to align the inlet of the draining duct at an acute angle with respect to the flow direction and to then lead it from the outer circumference of the rotary-cutting disk in a curve toward the inside.

[0006] This construction has been successful per se. ~~Particularly~~ However, the effect of ~~the~~ cavitation has been a problem. It is ~~an object of the invention~~ desirable to reduce ~~this~~ the effect of the cavitation and ~~preferably~~ to also reduce ~~the~~ stimulation of liquid-excited vibrations.

Before Paragraph 7, please insert the following:

SUMMARY

[0007] ~~The invention achieves this task by means of the object of Claim 1.~~ Among other things, the present disclosure addresses the problems noted above.

[0008] ~~Advantageous further developments are contained in the subclaims.~~ The present disclosure relates to a rotary-cutting disk for a centrifuge. The rotary-cutting disk includes a disk-shaped base section adjoined by a tube-shaped section. Also included is at least one draining duct for a liquid phase in the base section, the draining duct extending at an acute angle from an inlet at an outer circumference of the base section and in a flow direction of the liquid phase, the flow direction starting in curved manner toward an inside of the disk. The at least one draining duct includes walls extending from the inlet to an outlet. At least one of the walls of the draining duct is at least partially or in sections contoured in a wave shape.

[0009] ~~According to the invention, at least one wall or the wall contour of the draining duct, completely or in sections, has a wave-shaped construction.~~ The wave shape is preferably formed by at least one wave contour which has at least one reversing point. The wave contours reduce the cavitation effect, particularly in ~~the~~ a corner area, and additionally reduce the effect of liquid-excited vibrations. In this respect, it is ~~advantageous~~ desirable for ~~the~~ a slope α of the wave contours to be smaller than 20° in their reversing points relative to ~~the~~ a normal curve line K.

[00010] ~~In the following, the invention will be described in detail by means of embodiments with reference to the drawing.~~ Other aspects of the present disclosure will

become apparent from the following descriptions when considered in conjunction with the accompanying drawings.

Before Paragraph 11, please insert the following:

BRIEF DESCRIPTION OF THE DRAWINGS

[00011] Figure 1 is a top cross-sectional view of a rotary-cutting disk perpendicular to ~~the~~ an axis of rotation, according to the principles of the present disclosure.

[00012] ~~The rotary-cutting disk 1 has a usually axially relatively short, cylindrical, disk-shaped base section 2 which, perpendicular to the projection plane, is adjoined by a tube-shaped section of a smaller diameter, which is not shown here.~~ Figure 2 is a cross-sectional view of a tube-shaped section having a ring duct, according to the principles of the present disclosure.

Before Paragraph 13, please insert the following:

DETAILED DESCRIPTION OF THE DRAWINGS

[00013] ~~Figure 2 - from German Patent Document DE 199 12 773 A1 - shows how a tube-shaped section 10 may look, for example, according to the state of the art or also according to the invention, where this area is preferably not changed.~~ A rotary-cutting disk 1 has a usually axially relatively short, cylindrical, disk-shaped base section 2 which, perpendicular to a projection plane, is adjoined by a tube-shaped section 10 of a smaller diameter, as shown in Figures 1 and 2.

[00014] At least one draining duct 3, shown as the ~~A~~ draining duct 3, for a liquid phase L is constructed in the disk-shaped section 2. Relative to ~~the~~ a flow direction of the liquid L, ~~the~~ an inlet 8 of the draining duct 3 is aligned at an acute angle. Then, the draining duct 3 extends from ~~the~~ an outer circumference of the rotary-cutting disk 1 in a curve toward ~~the~~ an inside of the disk 1. Here, an approximate deflection by slightly more than 90° takes place in the disk-shaped section 2 in a ring duct 11 around ~~the~~ an intake tube. The ring duct 11 may be ~~or~~ one or more ducts 11, ~~(~~for example, as shown in ~~of the type of~~ Figures 1 and 2~~) at the shaft~~.

[00015] For improving ~~the~~ flow conditions and for reducing ~~the~~ cavitation, at least ~~the~~ a contour of one of ~~a~~ walls 4, 5, ~~- in the case of a round or polygonal, particularly rectangular - cross-section, completely or in sections, has a~~ is wave-shaped ~~further development~~ or is

provided with at least one wave contour 6a, 6b~~;~~, 7a, 7b. The walls 4, 5 may possibly be of a round or polygonal, particularly rectangular cross-section, completely or in sections.

[00016] A wave of a wavelength λ~~, according to the definition, consists of~~ includes two ~~(~~half-~~)~~half-wave contours 6a and 6b or 7a and 7b, which, relative to a normal curve line K, illustrated ~~here~~ by a broken line on Fig. 1, which extends through ~~the~~ reversing points W of the wave, are positively and negatively aligned and ~~which~~ each ~~have~~ has a ~~wave~~length of λ/2.

[00017] Preferably, the walls 4, 5 ~~has~~ have no sharp edges from the inlet 8 to the outlet 9. ~~;~~ ~~that is, a~~A function, for example, ~~(such as~~ a sine function~~)~~ describing the contour of the wall~~(s)~~ 4, 5 can be differentiated at any point along the walls 4, 5, with the exception of the inlet 8 and the outlet ~~8,~~9, ~~from the draining duct 3~~ and with the exception of ~~the~~ corner areas, ~~(~~for example, in the case of a cross-section which is not round and is rectangular~~)~~.

[00018] ~~Preferably, a~~ A plurality of wave contours 6a, 6b~~;~~, 7a, 7b ~~is~~ may be provided. At least one of the walls 4, 5 should be equipped at least in sections with a ~~(~~half~~)~~-wave contour 7a, particularly in the inlet 8 area and~~, again particularly advantageously, the~~ wall 5 which is situated opposite ~~the~~ acute-angle corner area E.

[00019] With respect to their geometry, the wave contours 6a, 6b~~;~~, 7a, 7b may, ~~but~~ but do not have ~~to~~ to follow a trigonometric formula, such as a sinusoidal curve. Their ~~wave~~ length λ/2 should be greater, particularly at least two times greater than its amplitude A.

[00020] According to another ~~variant~~embodiment of the present disclosure, it is also conceivable that the wave contours 6a, 6b, 7a, 7b are mutually phase-shifted at the different walls 4, 5. In ~~the~~ various areas of the wall~~(s)~~ 4, 5 of the draining duct 3, equiphase or ~~not~~ non-equiphase wave contours 6a, 6b~~;~~, 7a, 7b may therefore be constructed in the walls 4, 5~~;~~ or, equiphase wave contours 6a, 6b~~;~~, 7a, 7b may be situated opposite one another, ~~(~~for example, such that ~~the~~ a width of the draining duct 3 is constant~~)~~, or, for example, opposite-phase wave contours 6a, 6b, 7a, 7b may also be formed.

[00021] According to ~~a variant~~another embodiment of the present disclosure, the wavelength λ may also change from the inlet 8 to the outlet 9; that is, increase or decrease continuously. In particular, this may further ~~reduces~~ reduce undesirable vibration effects.

[00022] ~~Advantageously, the~~ The slope α of the wave contours 6a, 6b, 7a, 7b, at their reversing points W, amounts to less than 20° relative to the ~~preferably~~ reversing-point-free normal curve line K through the reversing points W.

[00023] The liquid L flows into the draining duct 3 at a velocity ~~v~~V. The wave contours 6a, 6b, 7a, 7b may reduce the cavitation effect, particularly in the corner area E.

Please add the following new Paragraph:

[00024] Although the present disclosure has been described and illustrated in detail, it is to be clearly understood that this is done by way of illustration and example only and is not to be taken by way of limitation. The scope of the present disclosure is to be limited only by the terms of the appended claims.

~~List of Reference Symbols~~

~~Rotary cutting disk~~	~~1~~
~~base section~~	~~2~~
~~draining duct~~	~~3~~
~~flow direction~~	~~V~~
~~wall~~	~~4, 5~~
~~wave contours~~	~~6a, 6b; 7a, 7b~~
~~inlet~~	~~8~~
~~outlet~~	~~9~~
~~tube shaped section~~	~~10~~
~~duct~~	~~11~~
~~wavelength~~	~~λ~~
~~amplitude~~	~~A~~
~~liquid~~	~~L~~
~~normal curve line~~	~~K~~
~~reversing points~~	~~W~~
~~corner area~~	~~E~~
~~slope~~	~~α~~

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